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[Claim(s)]

[Claim 1]

Where adhesive tape which used a polyimide film for a component of a substrate at the light sensing portion side of an image sensor is pasted together in a mounting step of an image sensor using a solid imaging device, A mounting method of an image sensor carrying out a soldering connection reflow of the terminal area of an image sensor the substrate side by heating at not less than 170 **.

[Claim 2]

A mounting method of the image sensor according to claim 1 characterized by using silicone series material at least as a binder component of said adhesive tape.

[Claim 3]

A mounting method of the image sensor according to claim 1 or 2 not providing an adhesive layer in a portion concerning a light sensing portion of said image sensor in said adhesive tape.

[Claim 4]

A mounting method of the image sensor according to any one of claims 1 to 3, wherein heat conductivity of said substrate at 170 ** is below $5x10^{-4}$cal/cm-sec and **.

[Claim 5]

A mounting method of the image sensor according to any one of claims 1 to 4, wherein a heat shrinkage rate of said adhesive tape after carrying out 180 ** heating for 1 hour is 1.0% or less.

[Claim 6]

A mounting method of the image sensor according to any one of claims 1 to 5, wherein adhesive power of said adhesive tape after carrying out 180 ** heating for 1 hour is 0.1 - 8.0N/19mm width.

[Claim 7]
Adhesive tape being the adhesive tape used for a component of a substrate, and using a polyimide film for a mounting method of the image sensor according to any one of claims 1 to 6.

[Detailed Description of the Invention]
[Field of the Invention]
[0001]
This invention relates to the mounting step of the image sensor which used the solid imaging device.
[Background of the Invention]
[0002]
The image sensor using a solid imaging device is widely used for a digital camera, a video camera, etc. in recent years. In manufacturing processes including the substrate side mounting of these image sensor, adhesion of the crack of an image sensor surface and garbage has a high possibility of carrying out direct influence to an image pick-up. Then, the technique of avoiding the adhesion of a crack and garbage in mounting and a manufacturing process by sticking on the light sensing portion side of an image sensor is taken, using adhesive tape as a surface protection tape.
[0003]
On the other hand, when it mounts an image sensor in a substrate etc., the technique of carrying out soldering connection mounting of every one place of the terminal area using a soldering iron has been used until now. In recent years, since the terminal number has also increased by leaps and bounds with the high definition of an image sensor, and advanced features, carrying out soldering connection mounting one terminal at a time using a soldering iron will also require time remarkably, and it is not realistic. [of time] Then, the method of carrying out connection mounting at once by supplying the terminal area and mounting board of an image sensor to a solder reflow furnace, where position ****** is carried out was used more often.
[0004]
However, it is necessary to heat a solder reflow furnace to the elevated temperature more than the melting point of solder at least. If a heating reflow is carried out with the adhesive tape stuck aiming at the above-mentioned protection, it can become even a cause by which the deterioration thing by the heat deterioration of the position gap by heat modification contraction

of an adhesive tape substrate, peeling, or adhesive tape material pollutes the surface of an image sensor conversely. For a certain reason, the not less than 170 ** reflow treatment in an elevated temperature of especially the color filter used inside the solid imaging device itself is difficult also for denaturation or the possibility of breakage by heat.

[0005]

Therefore, conventionally, just before supplying to a solder reflow furnace, masking tape is once exfoliated, solder reflow is carried out at about 160 **, and masking tape is anew restuck after an end. Thus, it was difficult to pass through the high heating process for solder reflow in the state where adhesive tape has been pasted together.

[Description of the Invention]

[Problem to be solved by the invention]

[0006]

Therefore, in the mounting step of the image sensor by which the solid imaging device was used for the purpose of this invention, It is in providing the adhesive tape for protection used for the mounting method of an image sensor and it it also enables the inside of solder reflow to make solder reflow possible in the state which stuck adhesive tape on the light-receiving side of an image sensor freely, and to protect the light-receiving side of an image sensor.

[Means for solving problem]

[0007]

As a result of repeating examination wholeheartedly that said SUBJECT should be solved, this invention persons find out that said purpose can be attained by use of the mounting method or adhesive tape shown below, and came to complete this invention.

[0008]

It is in the state which this invention is a mounting method of an image sensor, and pasted together the adhesive tape which used the polyimide film for the component of the substrate at the light sensing portion side of an image sensor in the mounting step of the image sensor using a solid imaging device, A soldering connection reflow of the terminal area of an image sensor is carried out the substrate side by heating at not less than 170 **.

[0009]

With a high light sheilding peculiar to a polyimide film, and low thermal conductivity according to this invention, the high heat-resisting property of polyimide not only enables it to suppress the remarkable heat modification and contraction of adhesive tape in the high temperature process in solder reflow, but, It becomes possible to control conduction of the heat to the color filter used into the solid imaging device. Therefore, since it has not only a operation effect but a specific operation effect which controls the heat deterioration of the color filter inside a solid imaging device as mere heat-resistant masking tape by a polyimide substrate, it becomes possible to carry out the not less than 170 ** heating process in sufficient elevated

temperature.

[0010]

In this invention, silicone series material is used at least as a binder component of said adhesive tape.

[0011]

While such composition raises a heat-resisting property, exfoliation adhesive power can be made easy to control.

[0012]

This invention is a mounting method of the above-mentioned image sensor, and an adhesive layer is not provided in the portion concerning the light sensing portion of said image sensor in said adhesive tape.

[0013]

It is what plans the consistent process in the state where adhesive tape was pasted together with devising a substrate and an adhesive layer about the adhesive tape for protection of an image sensor in this invention, It thinks out that do not remain a binder on the adherend surface in the case of the tape exfoliation after component mounting, and working efficiency goes up by not providing an adhesive layer in the portion corresponding to the light sensing portion of the adhesive tape concerned. Where [that is,] the adhesive tape of composition of not providing an adhesive layer is pasted together to a euphotic portion in the mounting step of an image sensor, using the film which has a heat-resisting property in the light sensing portion side of an image sensor at least as a substrate component, By passing through a not less than 170 ** heating process, it becomes possible to provide the mounting method of an image sensor with high workability, safety, and productivity.

[0014]

It is a mounting method of the above-mentioned image sensor, and heat conductivity of said substrate at 170 ** is characterized by being below $5x10^{-4}$cal/cm-sec and **.

[0015]

Many also build the color filter in the image sensor used as a solid imaging device, and cannot bear the elevated temperature at the time of mounting in many cases. With a heat-resisting property, its heat conductivity is also low, and since the polyimide film which constitutes the substrate of the adhesive tape of this invention has a heat-conduction depression effect, it is useful not only to physical protection of the image sensor itself but protection of a color filter.

[0016]

This invention is a mounting method of the above-mentioned image sensor, and is characterized by the heat shrinkage rate of said adhesive tape after carrying out 180 ** heating for 1 hour being 1.0% or less.

[0017]

That is, it is preferred that contraction of a substrate is small in mounting of an image sensor as mentioned above, Since the process in high temperature regions, such as soldering, is included especially, it is what acquired the knowledge that it was preferred to make contraction of the substrate under high temperature service into the above-mentioned range, and working efficiency goes up further by clarifying such additional conditions.

[0018]

This invention is a mounting method of the above-mentioned image sensor, and is characterized by the adhesive power of said adhesive tape after carrying out 180 ** heating for 1 hour being 0.1 - 8.0N/19mm width.

[0019]

That is, in order to prevent exfoliation of adhesive tape, while the adhesive power more than predetermined is required, in order to prevent survival of the adhesive layer after exfoliating a tape from adherend, it is necessary to consider it as the adhesive power below predetermined. If it is when it includes the mounting step in a high temperature region especially, It is what acquired the knowledge that it was preferred to make adhesive power of the adhesive tape under heating conditions into the above-mentioned range, and do not spoil the function of adhesive tape, and a binder is not made to remain on the adherend surface by this in the case of exfoliation of the tape after component mounting, and working efficiency goes up.

[0020]

This invention is the adhesive tape used for the component of the substrate, and uses a polyimide film for the mounting method of one of the above-mentioned image sensors.

[0021]

While protecting an image sensor surface contamination by a foreign matter, and with a crack, the adhesive tape which can work is required of the above-mentioned mounting method, without exfoliating a tape also in the component-mounting process under heating conditions, such as soldering. In this invention, it becomes possible to fill such a demand by providing the adhesive tape for surface protection which has the outstanding heat-resisting property, thermal contraction nature, and tackiness which use a polyimide film as a substrate.

[Effect of the Invention]

[0022]

[as mentioned above the thing which according to this invention a consistent process becomes possible in a mounting step or inspection processes, such as parts of a solid imaging device, etc. where adhesive tape is pasted together] It becomes possible to provide the mounting method of an image sensor with high workability and productivity, protecting an image sensor surface. It combines, and at the time of mounting of such an image sensor, the thermal contraction nature which can be used is high and it becomes possible to provide the adhesive tape for protection which has the outstanding heat-resisting property.

[Best Mode of Carrying Out the Invention]

[0023]

Hereafter, an embodiment of the invention is described.

[0024]

In the mounting step of the image sensor which used the solid imaging device, the mounting method of the image sensor of this invention is in the state which pasted together the adhesive tape which used the polyimide film for the component of the substrate, and carries out a soldering connection reflow of the terminal area of an image sensor to the light sensing portion side of an image sensor the substrate side. [sensor / using a solid imaging device here / image] It is the image sensor which package-ized the solid imaging device generally called CCD (Charge Coupled Device) or CMOS (Complementary MOS) using transparent resin, a glass material, etc.

[0025]

The light sensing portion side of this image sensor means the surface side of the sensor which receives an image, from transparent resin, glass covering, etc. being covered in most cases, a common image sensor is substantial, in order to protect an imaging device -- it includes that adhesive tape is pasted together to the surface of these transparent resin or a cover glass. Although the portion which is equivalent to a light sensing portion at least as a field should just be protected, the other portion may be covered for protection.

[0026]

Although the adhesive tape of this invention is fundamentally formed from the adhesive layer provided in one side of the tape substrate and the substrate, it may be pasting the mold releasing film together to the substrate of adhesive tape. That is, by sticking on at least one field the mold releasing film which performed mold release treatment via an adhesive layer at the substrate of adhesive tape, an adhesive layer can be protected and protection of an image sensor surface can be aimed at. It is desirable to remove and use adhesive tape in arbitrary stages from the image sensor mounted by doing in this way.

[0027]

As for adhesive tape, it is preferred not to provide an adhesive layer in the portion concerning the light sensing portion of an image sensor. It is not to remain a binder on the adherend surface in the case of the tape exfoliation after component mounting, and for working efficiency to go up.

[0028]

It faces forming the adhesive layer 2 on the substrate 1, and the adhesive layer 2 of the width b can be formed in both ends, and, specifically, the method of producing adhesive tape, etc. can be mentioned to the portion concerning the light sensing portion of the image sensor of the center of adhesive tape so that the non-application portion of the width a may be made, so that

it may illustrate to drawing 1. However, the shape of the adhesive layer 2 will not be what is limited especially, if a non-application portion comes made into the portion which starts the light sensing portion of an image sensor fundamentally, For example, it is possible to apply various methods, such as a method of providing scooping out of arbitrary shape, such as the (A) circle configuration and (B) corniform, how to form the adhesive layer 2 in the four corners of the (C) substrate 1, the method of forming the non-application portion of the inclined form of (D) prescribed width, so that it may illustrate to drawing 2. The drawing 2 slash part shows the binder application portion.

[0029]

By the above method, the adhesive layer 2 is inclined to an image sensor surface, there is nothing, and the influence on a light sensing portion can be prevented by forming so that covering area may be secured, securing the attachment hardness to an image sensor surface enough.

[0030]

As adhesive tape stuck on these, it is required to use the polyimide film for the component of a substrate. It is because work becomes possible, without exfoliating a tape also in the component-mounting process under heating conditions by forming the adhesive tape for surface protection which has the outstanding heat-resisting property, thermal contraction nature, and tackiness.

[0031]

Although a polyimide film in particular here is not limited, in order to fully demonstrate the brown shielding effects which the rigidity as a tape and a polyimide film have, it is desirable to have a certain amount of thickness. Specifically, it is good to have a thickness of not less than 20 micrometers more preferably not less than 10 micrometers in thickness.

[0032]

Although a polyimide film independent may be sufficient as a substrate, they may be the substrate which had and laminated one or more layers of polyimide film layers at least, and the film which contained polyimide material as a raw material. Arbitrary surface preparation, stretching treatment or a plasticizer, and an additive may be contained.

[0033]

However, in order to fully have an effect of the heat-conduction inhibition to a color filter, it is desirable for the heat conductivity at 170 ** to be below $5x10^{-4}$cal/cm-sec and ** as a substrate. Heat conductivity of a polyimide film is also low in a heat-resisting property, and, in addition to physical protection of the image sensor itself, it becomes possible to protect a color filter against the elevated temperature at the time of mounting.

[0034]

Although the construction material in particular of a binder is not limited, acrylic pressure

sensitive adhesive or silicone pressure sensitive adhesive is specifically mentioned. It can be said that especially silicone pressure sensitive adhesive is the adhesive material which the design of the adhesive tape which is adjusting arbitrarily the adhesive power at the time of exfoliating a tape after mounting is completed eventually, and it not only excels in a heat-resisting property, but was excellent in handling from adjustment of adhesive power being easy of was attained, and was especially suitable.

[0035]

Furthermore by this invention, the feature of carrying out a soldering connection reflow of the terminal area of an image sensor the substrate side by heating at not less than 170 ** is carried out. This showed mounting by the soldered joint which used the reflow furnace, and the highest temperature under treatment with a reflow furnace should just specifically be over 170 **.

[0036]

As for the thickness of the adhesive layer of adhesive tape, it is preferably desirable that it is [not less than 5 micrometer] 30 micrometers or less still more preferably not less than 3 micrometers 50 micrometers or less 1 micrometers or more 100 micrometers or less. If a level difference is produced in reservation of an adhesive layer to a base material surface, it is effective in it, but when it is less than 1 micrometer, it may contact and damage to a euphotic portion by bending of a surface protection tape, and attachment nature also falls. Exfoliation of adhesive tape may be produced by the thermal contraction of the film under heating. When exceeding 100 micrometers, a binder may be applied to a euphotic portion according to modification of the binder by the pressure to the tapes at the time of modification of the binder at the time of slit processing and the punching process of a tape or the application of pressure at the time of DE 1 PU attachment, and transportation, etc. and heating at the time of mounting.

[0037]

that is, -- while the hardness on predetermined mounting is required as adhesive tape for protection of an image sensor -- an image sensor -- it harmonized -- it is necessary to stick and to hold a doubling state and, and workability is also demand. Therefore, the adhesive tape in this invention finds out that a mentioned range is the optimal range as a result of survey. Therefore, the adhesive tape which has the thickness of such an adhesive layer enables it to provide the mounting method of an image sensor with high workability, safety, and productivity.

[0038]

In this invention, the heat shrinkage rate of the adhesive tape after carrying out 180 ** heating for 1 hour is wanted to be 0.3% or less still more preferably 0.5% or less more preferably 1.0% or less. It is for raising working efficiency with clarifying additional conditions about contraction

of the substrate under high temperature service further. A heat shrinkage rate here is stuck on a BA plate with an adhesive tape form, and the value after neglecting it under 180 ** temperature conditions for 1 hour serves as a basis. The measuring method of a concrete heat shrinkage rate cuts adhesive tape into a 20-mm angle, it stuck on the BA plate, and heated under 180 ** temperature conditions, and both MD directions and a TD direction boiled, attached and measured the size of the tape before and behind the heating using the projector (Mitutoyo make: PROFILEPROJECTOR PJ-H 300F). The BA plate refers to SUS304 board (BA No. 5 finishing SUS304 by Nippon Kinzoku Co., Ltd.) which carried out surface finish to BA No. 5 according to JIS "BA finishing."

[0039]

In this invention, it is preferred that the adhesive power of the adhesive tape after carrying out 180 ** heating for 1 hour is 0.1 - 8.0N/19mm width, 0.2N - 5.0N/19mm width is more preferred, and also 0.3N - 4.0N/19mm width is much more preferred. It is because exfoliation of adhesive tape may be produced in the adhesive power exceeding 8.0N/19mm by the thermal contraction of the film under heating with which the tape exfoliation from adherend may make an adhesive layer process top difficulty and the adherend surface remain, and is less than 0.1N/19mm. The value which measured adhesive power here according to JIS Z0237 serves as a basis.

[0040]

When using a mold releasing film for adhesive tape, which a publicly known thing may be used for a mold releasing film. Specifically, that by which the mold release coated layer, for example, a silicone layer, was formed in the plane of composition with the adhesive layer of the substrate of a mold releasing film can be used. As a substrate of a mold releasing film, the resin film which consists of a paper material like the Glassine paper, polyethylene, polypropylene, polyester, etc., for example is mentioned.

[0041]

This adhesive tape may be processed according to the size of the use, for example, the target solid imaging device. If it is the method of uniform shape being maintained about a processing method, and not leaving a binder to a processing cross section, it will not be limited in particular, but in view of productivity, a punching process is preferred.

[Working example]

[0042]

Hereafter, the embodiment etc. which show the composition and the effect of this invention concretely are described. The valuation method in an embodiment etc. was performed as follows. It cannot be overemphasized that they are not an embodiment which requires this invention, and a thing limited to a valuation method.

[0043]

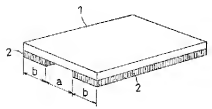
<Valuation method>
The following item [tape / which was produced by the above-mentioned conditions] was evaluated.
(1) Shape of the tape after heating
Shape of the tape after sticking the sample of above-mentioned embodiment and comparative example on a glass surface and neglecting it under 180 ** temperature conditions for 1 hour
(2) The state of the glass surface after tape exfoliation
The state of the glass surface after tape exfoliation was checked visually.
[0044]
<Embodiment 1>
Polyimide film (Du Pont-Toray Kapton 100H: 25 micrometers in thickness.) The heat conductivity at 170 ** created the adhesive tape which applied silicone pressure sensitive adhesive (SD-4580 by Toray Industries Dow Corning) to 10 micrometers in thickness to abbreviation $4.1x10^{-4}$cal/cm-sec and **, and pasted together to the surface glass of a CCD package at it. This was supplied to the solder reflow furnace for highest temperature [of 180 **] x 5 seconds (the making time of a reflow furnace including remaining heat etc. is about 90 seconds), and it mounted to the substrate. The tape after the completion of mounting was exfoliated.
In the surface after tape exfoliation, neither a crack nor an adhesion foreign matter was checked, and the result checked the normal operation as a CCD.
[0045]
<Comparative example 1>
It carried out like Embodiment 1 except having used for the 25-micrometer-thick nylon film (Toray Industries [, Inc.] make 6 nylon: about [thermal conductivity] $5.5x10^{-4}$cal/cm-secand**) the adhesive tape in which the storage modulus applied the rubber pressure sensitive adhesive of $2.0x10^{3}N/cm^{2}$ to 10 micrometers in thickness.
As a result, it pasted together by the thermal contraction of the tape, and in the field where position gap occurred and exfoliated into the portion, the binder which carried out heat deterioration remained in the surface, and was polluting. With the temperature of a reflow, probably because the color filter inside CCD was damaged, the CCD itself did not operate normally.
[0046]
<Reference example 1>
On the substrate which consists of 2-micrometer-thick polyethylenenaphthalate, the 10-mm-wide application part and the 10-mm-wide uncoated portion were applied to the shape of a stripe by turns, the solution of acrylic pressure sensitive adhesive was dried, and the pressure

sensitive adhesive sheet in which the 5-micrometer-thick adhesive layer was formed was produced. The slit of this pressure sensitive adhesive sheet was carried out by 20-mm width so that a non-application portion might become in the center of a tape, and adhesive tape was obtained. It becomes adhesive tape (a= 10 mm in drawing 1, and b= 5 mm). After carrying out 180 ** heating for this adhesive tape for about 1 hour, when adhesive power was measured according to JIS Z0237, it was 1.0N/19mm, and the heat shrinkage rate was 0.15%.
As for the shape of the tape after heating, the float and exfoliation from the glass surface of a tape were not checked.
[0047]
<Reference example 2>
The adhesive tape produced by the same method as the reference example 1 was obtained except not applying the solution of acrylic pressure sensitive adhesive in the shape of a stripe. After carrying out 180 ** heating for this adhesive tape for about 1 hour, when adhesive power was measured according to JIS Z0237, it was 2.0N/19mm, and the heat shrinkage rate was 0.15%. The foreign matter in which the tape after heating originates in a binder in the glass surface after tape exfoliation was checked.
[0048]
It is conclusion > as a result of <.
From the above result, the surface protection adhesive tape used at the time of CCD package molding excellent in a heat-resisting property and workability was able to be provided.
[Brief Description of the Drawings]
[0049]
[Drawing 1]The explanatory view showing the fundamental composition of the adhesive tape concerning Embodiment 2 of this invention.
[Drawing 2]Explanation which shows this invention other composition of the adhesive tape concerning Embodiment 2.
[Explanations of letters or numerals]
[0050]
1 Substrate
2 Adhesive layer

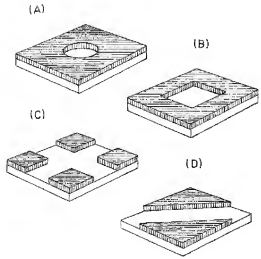
[Brief Description of the Drawings]
[0049]
[Drawing 1]The explanatory view showing the fundamental composition of the adhesive tape

concerning Embodiment 2 of this invention.
[Drawing 2]Explanation which shows this invention other composition of the adhesive tape concerning Embodiment 2.

[Drawing 1]



[Drawing 2]



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